

WRIGHT-PATTERSON AIR FORCE BASE. AREA B,
BUILDING 20, PROPELLER LABORATORY
DAYTON VIC.
GREENE COUNTY
OHIO

HAER No. OH-79-J

HAER
OHIO
29-DAYT.V,
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
P.O. Box 37127
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HISTORIC AMERICAN ENGINEERING RECORD
WRIGHT-PATTERSON AIR FORCE BASE, AREA B
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Location: Northwest corner of 7th and E Streets; Wright-Patterson Air Force Base, Area B, Dayton Vicinity, Greene County, Ohio.

Dates of Construction: 1927-29, 1931, 1942.

Present Owner: USAF.

Present Use: First floor and basement - Aeronautical Systems Center.
Second floor - Recon and Defense Office, Avionics Systems Division.

Significance: Built incrementally from 1927 until 1942, this structure has specialized construction designed to accommodate the testing of propellers and drive motors as well as containing space for supporting functions such as a shop and engineering offices. The experiments conducted here were essential to aircraft technology before adoption of the jet engine.

Project History: This report is part of the overall Wright-Patterson Air Force Base, Area B documentation project conducted by HAER 1991-1993. See overview report, HAER No. OH-79, for a complete description of the project.

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DESCRIPTION: Building 20 is a two-story, nine-bay, concrete building, measuring 98' x 277', with a basement and a bowstring truss roof. There is a brick entrance structure attached to the east end of the building with steel sash and glass-block windows above and on either side. On the south side there are nine pairs of windows and seven pairs on the north side. The east wall is decorated with Art Moderne detail in the form of three horizontal grooves in the concrete.

HISTORY: In 1927 construction began on the earliest section of what is now Building 20 as the generator-power house for the 2,500 horsepower variable speed drive propeller test stand (later called Rig 3) and bomb pad that were transferred from McCook Field. However, the facility was not completed until May 1929 and, in the meantime, testing continued at McCook Field. The floors were designed for 250 and 500 p.s.f. and the walls were built to a thickness of 18", incorporating $\frac{5}{8}$ " round bars at 12" centers for reinforcement. The original construction included a tunnel from the power house to the control room located beneath the test stand. The tunnel was used for power cabling and utilities to the test stand and personnel access to the control room. A 40-ton crane and craneway was originally used in the construction of the generators and test rig drive motors, and the installation of test articles. The craneway still supports the maintenance of the generators, drive motor, and movement of test articles.

Two additional test stands (Rigs 1 and 2) and bomb pads were completed in 1931 with 6,000 horsepower and 3,000 horsepower capabilities. In 1942 a two-story shop and engineering building was added to the west end of the power house to support Propeller Laboratory activities. This whole structure is now designated Building 20.

In 1944 an acoustical enclosure was constructed around the three test stands and the original Helicopter Rotor Test Stand located between Rig 1 and the power house. This is now Building 20A (described in the following report).

The Laboratory worked on developing propellers, propeller hubs and controls for aircraft of rapidly increasing size and power, for Army and Navy fighters, bombers, cargo and passenger planes and VTOL aircraft. Among the Laboratory's concerns were such new devices as the dual-rotation propeller (in which two sets of blades turn at the same time but in opposite directions); gearing systems for the control of propeller speed; and technologies to carefully control blade pitch. During World War II the emphasis was on aircraft maneuverability, as needed in combat situations, rather than on speed itself. Jet propulsion, although known to U.S.

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aeronautical engineers at the time and used on German aircraft and weaponry, did not come to fully occupy U.S. Army Air Corps engineers until after the armistice. Thus, propellers maintained their paramount importance at the Wright Field facilities throughout the war period.

In 1957 the Propeller Laboratory was assimilated into what became known as the Aero Propulsion and Power Directorate of Wright Laboratory. The engineering offices were occupied by the Wright Air Development Center in the following year. In 1964 Tech Photo Services took over the first floor and basement, merging with Avionics Systems Division Graphics in 1990 to become the Aeronautical Systems Division (now Aeronautical Systems Center) Visual Information Center. The Avionics Systems Division's Recon and Defense Office occupies the second floor.

For bibliography, see Wright-Patterson Air Force Base overview report (HAER No. OH-79).